

### Chapter 1 : Formats and Editions of Endocrine disruptors - part II [www.nxgvision.com]

*Extra resources for Endocrine Disruptors Part II (Handbook of Environmental Chemistry) Sample text ], the individual hormone data were not adjusted for concentrations of other hormones, although there are many inter-correlations between these.*

Series on Testing and Assessment: The document is intended to provide guidance for evaluating chemical using standardised test guidelines. The general approach taken by the document is primarily to provide guidance on how test results might be interpreted based on the outcome of standardised assays. Key questions addressed in the document concern likely mechanisms of endocrine action and any resulting apical effects that can be attributed to such action. The document is not proscriptive but provides suggestions for possible next steps in testing if any which might be appropriate for a regulatory authority to take, given the various data scenarios. The guidance document is focused primarily on endocrine modalities included in the conceptual framework; estrogen, androgen, and thyroid mediated endocrine disruption and chemicals that interfere with steroidogenesis. New scoping document on in vitro and ex vivo assays for the identification of modulators of thyroid hormone signalling No Guidance document GD on standardised test guidelines for evaluating chemicals for endocrine disruption: Case studies using example chemicals No Detailed review paper on the state of the science on Novel in vitro and in vivo screening and testing methods and endpoints for evaluating endocrine disruptors No Report on the retrospective analysis of 2-generation reprotoxicity data No Performance standards for stably transfected transactivation in vitro assays to detect estrogen agonists for TG No Peer review report for the validation of the stably transfected transcriptional activation assay for the detection androgenic and anti-androgenic activity of chemicals No Report of progress on the interlaboratory validation of the OECD harpacticoid copepod development and reproduction test No Guidance document on standardised Test Guidelines for evaluating chemicals for endocrine disruption No Guidance document on the androgenised female stickleback screen No Peer Review report for the validation of the fish sexual development test and agreement of the Working Group of National Co-ordinators of the Test Guidelines Programme on the follow-up of the peer review No Report of the phase 2 of the validation of the fish sexual development test for the detection of endocrine substances No Report of the phase 1 of the validation of the fish sexual development test for the detection of endocrine substances No Detailed review paper on environmental endocrine disruptor screening: The use of estrogen and androgen receptor binding and transactivation assays in fish No Peer review report for the HR cell-based assay for steroidogenesis No Report of the multi-laboratory validation of the HR steroidogenesis assay to identify modulators No Validation report on the day androgenised female stickleback screening assay No Peer review report of the validation of the day androgenised female stickleback screening assay No Guidance document on the diagnosis of endocrine-related histopathology in fish gonads No Workshop report on OECD countries activities regarding testing, assessment and management of endocrine disrupters No Guidance document on the weanling hershberger bioassay in rats: A short-term screening assay for anti androgenic properties No Report of the expert consultation to evaluate an estrogen receptor binding affinity model for hazard identification No Report of the validation peer review for the weanling hershberger bioassay and agreement of the Working of National Coordinators of the Test Guidelines Programme on the follow-up of this report No Literature review on the day fish assay and the fish short-term reproduction assay No Report of the validation of the hershberger bioassay Weanling Model No Guidance document for histologic evaluation of endocrine and reproductive tests in rodents.

**Chapter 2 : Scientific knowledge of endocrine disrupting chemicals | UN Environment**

*The field of endocrine disruption or endocrine active compounds (EACs), which is just emerging and still controversial, is comprehensively covered by leading experts in Volume 3, Subvolumes L (Part I) and M (the present volume, Part II).*

History[ edit ] The term endocrine disruptor was coined at the Wingspread Conference Centre in Wisconsin, in 1991. One of the early papers on the phenomenon was by Theo Colborn in 1993. Although the endocrine disruption has been disputed by some, [11] work sessions from 1991 to 1993 have generated consensus statements from scientists regarding the hazard from endocrine disruptors, particularly in wildlife and also in humans. Some are pervasive and widely dispersed in the environment and may bioaccumulate. Some are persistent organic pollutants (POPs), and can be transported long distances across national boundaries and have been found in virtually all regions of the world, and may even concentrate near the North Pole, due to weather patterns and cold conditions. Prior to its ban in the early 1970s, doctors prescribed DES to as many as five million pregnant women to block spontaneous abortion, an off-label use of this medication prior to 1971. It was discovered after the children went through puberty that DES affected the development of the reproductive system and caused vaginal cancer. The relevance of the DES saga to the risks of exposure to endocrine disruptors is questionable, as the doses involved are much higher in these individuals than in those due to environmental exposures. The team pointed to wide gaps in knowledge and called for more research to obtain a fuller picture of the health and environmental impacts of endocrine disruptors. To improve global knowledge the team has recommended:

**Endocrine system** Endocrine systems are found in most varieties of animals. The endocrine system consists of glands that secrete hormones, and receptors that detect and react to the hormones. Hormones travel throughout the body and act as chemical messengers. Hormones interface with cells that contain matching receptors in or on their surfaces. The hormone binds with the receptor, much like a key would fit into a lock. The endocrine system regulates adjustments through slower internal processes, using hormones as messengers. The endocrine system secretes hormones in response to environmental stimuli and to orchestrate developmental and reproductive changes. These systems work together to maintain the proper functioning of the body through its entire life cycle. Sex steroids such as estrogens and androgens, as well as thyroid hormones, are subject to feedback regulation, which tends to limit the sensitivity of these glands. Hormones work at very small doses part per billion ranges. Endocrine disruption can thereby also occur from low-dose exposure to exogenous hormones or hormonally active chemicals such as bisphenol A. These chemical can bind to receptors for other hormonally mediated processes. Thus, an endocrine disruptor can elicit adverse effects at much lower doses than a toxicity, acting through a different mechanism. The timing of exposure is also critical. Most critical stages of development occur in utero, where the fertilized egg divides, rapidly developing every structure of a fully formed baby, including much of the wiring in the brain. Interfering with the hormonal communication in utero can have profound effects both structurally and toward brain development. Depending on the stage of reproductive development, interference with hormonal signaling can result in irreversible effects not seen in adults exposed to the same dose for the same length of time. The interrelationship between exposures to chemicals and health effects are rather complex. It is hard to definitively link a particular chemical with a specific health effect, and exposed adults may not show any ill effects. These regulation effects are intertwined so that a hormone that is level affected by another hormone in turn affects the levels of multiple other hormones produced by the body itself, leaving no endogenous hormones or traits affected by them unaffected by endocrine disruptors. Hormesis Most toxicants, including endocrine disruptors, have been claimed to follow a U-shaped dose response curve. For example, a common flame retardant, BDE, affects the reproductive system and thyroid gland of female rats in doses of the order of those to which humans are exposed. Nontraditional dose-response curves are referred to as nonmonotonic dose response curves. Some suspect fish consumption is a major source of many environmental contaminants. Indeed, both wild and farmed salmon from all over the world have been shown to contain a variety of man-made organic compounds. Consumer goods are another potential source of exposure to endocrine disruptors. An analysis of the composition of 42 household cleaning and personal care products versus 43

"chemical free" products has been performed. The products contained 55 different chemical compounds: Parabens, a class of chemicals that has been associated with reproductive-tract issues, were detected in seven of the "chemical free" products, including three sunscreens that did not list parabens on the label. The risk of exposure to EDCs increases as products, both conventional and "chemical free," are used in combination. Mennonites eat mostly fresh, unprocessed foods, farm without pesticides, and use few or no cosmetics or personal care products. One woman who had reported using hairspray and perfume had high levels of monoethyl phthalate, while the other women all had levels below detection. Three women who reported being in a car or truck within 48 hours of providing a urine sample had higher levels of diethylhexyl phthalate which is found in polyvinyl chloride, and is used in car interiors. Xenoestrogen Xenoestrogens are a type of xenohormone that imitates estrogen. Synthetic xenoestrogens include widely used industrial compounds, such as PCBs, BPA and phthalates, which have estrogenic effects on a living organism. Alkylphenols Alkylphenols are xenoestrogens. These compounds are also used as building block chemicals that are also used in making fragrances, thermoplastic elastomers, antioxidants, oil field chemicals and fire retardant materials. Through the downstream use in making alkylphenolic resins, alkylphenols are also found in tires, adhesives, coatings, carbonless copy paper and high performance rubber products. They have been used in industry for over 40 years. Certain alkylphenols are degradation products from nonionic detergents. Nonylphenol is considered to be a low-level endocrine disruptor owing to its tendency to mimic estrogen. Please review the contents of the section and add the appropriate references if you can. Unsourced or poorly sourced material may be challenged and removed. March Main article: Bisphenol A Bisphenol A chemical structure Bisphenol A is commonly found in plastic bottles, plastic food containers, dental materials, and the linings of metal food and infant formula cans. Another exposure comes from receipt paper commonly used at grocery stores and restaurants, because today the paper is commonly coated with a BPA containing clay for printing purposes. FDA issued a draft reassessment, reconfirming their initial opinion that, based on scientific evidence, it is safe. It is commonly found in thermal receipts, plastics, and household dust. Traces of BPS have also been found in personal care products. Before World War II, pyrethrum, an extract of a flower from Japan, had been used to control these insects and the diseases they can spread. Fearing an epidemic outbreak of typhus, every British and American soldier was issued DDT, who used it to routinely dust beds, tents, and barracks all over the world. DDT was approved for general, non-military use after the war ended. Its use for agricultural purposes has since been prohibited by national legislation of most countries, while its use as a control against malaria vectors is permitted, as specifically stated by the Stockholm Convention on Persistent Organic Pollutants [97] As early as, the harmful effects of DDT on bird, beneficial insects, fish, and marine invertebrates were seen in the environment. The most infamous example of these effects were seen in the eggshells of large predatory birds, which did not develop to be thick enough to support the adult bird sitting on them. Polychlorinated biphenyls Polychlorinated biphenyls PCBs are a class of chlorinated compounds used as industrial coolants and lubricants. PCBs are created by heating benzene, a byproduct of gasoline refining, with chlorine. In, Monsanto acquired the company, taking over US production and licensing PCB manufacturing technology internationally. Direct skin contact results in a severe acne-like condition called chloracne. Recent studies show the endocrine interference of certain PCB congeners is toxic to the liver and thyroid, [] increases childhood obesity in children exposed prenatally, [] and may increase the risk of developing diabetes. In Alaska it is thought that they may contribute to reproductive defects, infertility and antler malformation in some deer populations. Declines in the populations of otters and sea lions may also be partially due to their exposure to PCBs, the insecticide DDT, other persistent organic pollutants. Bans and restrictions on the use of EDCs have been associated with a reduction in health problems and the recovery of some wildlife populations. Polybrominated diphenyl ethers Polybrominated diphenyl ethers PBDEs are a class of compounds found in flame retardants used in plastic cases of televisions and computers, electronics, carpets, lighting, bedding, clothing, car components, foam cushions and other textiles. Plastics began to replace wood and metal in existing products as well, and today plastics are the most widely used manufacturing materials. Cotton had been the dominant textile used to produce home furnishings, [] but now home furnishings were composed of mostly synthetic materials. More than billion cigarettes were consumed

each year in the s, as compared to less than 3 billion per year in the beginning of the twentieth century. By the late s, approximately people in the US died each year in home fires. In they published their findings in America Burning, a page report [] that made recommendations to increase fire prevention. Most of the recommendations dealt with fire prevention education and improved building engineering, such as the installation of fire sprinklers and smoke detectors. Historically, treatments with alum and borax were used to reduce the flammability of fabric and wood, as far back as Roman times. Organic compounds based on halogens like bromine and chlorine are used as the flame retardant additive in plastics, and in fabric based textiles as well. Phthalates Phthalates are found in some soft toys, flooring, medical equipment, cosmetics and air fresheners. They are of potential health concern because they are known to disrupt the endocrine system of animals, and some research has implicated them in the rise of birth defects of the male reproductive system. One phthalate, bis 2-ethylhexyl phthalate DEHP , used in medical tubing, catheters and blood bags, may harm sexual development in male infants. Although there are no direct human studies the FDA report states: In view of the available animal data, precautions should be taken to limit the exposure of the developing male to DEHP". Blood serum levels of PFOA were associated with an increased time to pregnancy " or "infertility" " in a study. PFOA exposure is associated with decreased semen quality. PFOA appeared to act as an endocrine disruptor by a potential mechanism on breast maturation in young girls. A C8 Science Panel status report noted an association between exposure in girls and a later onset of puberty. Other suspected endocrine disruptors[ edit ] Some other examples of putative EDCs are polychlorinated dibenzo-dioxins PCDDs and -furans PCDFs , polycyclic aromatic hydrocarbons PAHs , phenol derivatives and a number of pesticides most prominent being organochlorine insecticides like endosulfan , kepone chlordecone and DDT and its derivatives, the herbicide atrazine , and the fungicide vinclozolin , the contraceptive alpha ethinylestradiol , as well as naturally occurring phytoestrogens such as genistein and mycoestrogens such as zearalenone. The molting in crustaceans is an endocrine-controlled process. In the marine penaeid shrimp *Litopenaeus vannamei* , exposure to endosulfan resulted increased susceptibility to acute toxicity and increased mortalities in the postmolt stage of the shrimp. TBT has been shown to impact invertebrate and vertebrate development, disrupting the endocrine system, resulting in masculinization, lower survival rates, as well as many health problems in mammals. On the other hand, monitoring programs of European breast milk samples have shown that PBDE levels are increasing.

### Chapter 3 : Endocrine disruptor - Wikipedia

*The field of endocrine disruption or endocrine active compounds (EACs), which is just emerging and still controversial, is comprehensively covered by leading experts in Volume 3, Subvolumes L (Part I) and M (the present volume, Part II). The major classes of endocrine active chemicals are discussed, as well as methods for their detection and.*

### Chapter 4 : Series on Testing and Assessment: Testing for Endocrine Disruptors - OECD

*The field of endocrine disruption or endocrine active compounds (EACs), which is just emerging and still controversial, is comprehensively covered by leading experts in Volume 3, Subvolumes L.*